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Data-driven Subnational Decision-making in the Arctic

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Data-driven Subnational Decision-making in the Arctic: the power of indigenous voices and data supporting the green transition

Pavel Tkach and Adam Stepien, Arctic Centre of the University of Lapland

Arctic PASSION, Horizon 2020, 101003472

Policy Brief / Summary

This Policy Brief summarizes the main outputs and preliminary findings of the Arctic PASSION project's work related to enhancing evidence-based decision-making at the local and regional level in the Arctic, with respect to two themes: 1) the state of inclusion of Indigenous knowledge in sub-national decision-making (including the patterns of interactions between Indigenous Peoples and local/regional policymakers); and 2) data availability, needs and gaps with respect to managing and planning green transition. The two topics are part of a selection of themes identified as being of interest to both local and regional governments and Arctic PASSION researchers. A full overview of the findings is provided in the related Policy Paper.

1. Inclusion of Indigenous Knowledge in sub-national decision-making:

- The general framework of cooperation with Indigenous communities in countries and jurisdictions with a non-indigenous majority (all territories except Greenland and Nunavut) is similar – national, regional, and local governments have an obligation to consult with Indigenous communities or their representative organisations when developing a project, measure, or legal act that has potential implications for Indigenous communities.
- There are clear differences between Arctic jurisdictions with respect to the degree to which Indigenous perspectives are included beyond consultation processes and how meaningful these consultations are. Indigenous Peoples' high level of independence to pursue own priorities is a hallmark of relations between Indigenous communities and regional/territorial/state/local authorities in both the Canadian Arctic and Alaska. In the European Arctic, collaboration between various levels of government and Indigenous communities is defined by the need to consult with the Sámi on topics that have potential implications for Indigenous cultures, livelihoods, lands and interests.
- Governance, especially in the North American Arctic, actively employs in decision-making and planning three-perspectives assessment: Indigenous, local, and scientific. The inclusion of Indigenous perspectives highlighted the importance of concepts prominent within Indigenous worldviews, such as connection, reciprocity, relationships, storytelling, and stewardship, and aided in understanding how Indigenous communities are connected to lands and waters.
- Interviewed policymakers emphasised the contextuality of Indigenous Knowledge, which becomes visible when Indigenous knowledge-holders provide information that is strongly anchored in the more holistic cultural and livelihood context. Therefore, IK requires a high level of local knowledge and expertise to

be properly interpreted, and as a result, cannot be easily retrieved and effectively used in decision-making.

The University of Lapland team, based on conducted interviews, emphasised that cooperation of Indigenous people, science and governance could benefit from:

- Facilitating awareness among subnational policymakers of the specific issues and challenges Indigenous populations face in specific regions.
- Increasing the number of persons with Indigenous identity in administrative bodies.
- Ensuring a better understanding of Indigenous communities' relations to land and water and facilitating further knowledge exchange between Indigenous communities, scientists/researchers and policymakers on practices of including Indigenous perspective to policies and plans.
- Providing results of scientific research transparently demonstrates a broad perspective on the activities that should be performed and how they would benefit the Indigenous and non-Indigenous population of the particular community.
- Ensuring that the inclusion of three parallel perspectives - Indigenous, local, and scientific - becomes a normal approach to developing risk assessments, reports, plans, and policies.

2. Data availability, needs and gaps with respect to managing and planning green transition at a subnational governance level:

In the context of Arctic communities, green transition refers primarily to the expansion of renewable energy production, extraction of critical minerals necessary for a global low-carbon economy, as well as the electrification of transport, extractive industries and processing activities. In addition, circular economy and waste management play a critical role. Local and regional governments are important actors in pursuing the green transition, including by adopting and implementing climate mitigation and adaptation strategies.

Three aspects are particularly relevant: a) understanding local/regional adaptation needs; b) challenges in assessing local/regional GHG emissions; c) information needs for local mitigation actions and for pursuing low-carbon economy opportunities; and d) the position of Indigenous Peoples with respect to the green transition.

a) Understanding local/regional adaptation needs

- Limited administrative capacities – human, knowledge and financial – hinder the possibilities for conducting evaluations and assessments.
- Identified knowledge/data gaps and challenges include: better understanding of oceans and ocean-local environments interactions; wind patterns projections; hydrology, lake ice and flooding risk data at a local level; long-term environmental impacts of wildfires on ecosystems, forests and lakes; lack of sufficient information on changes in food systems; limited data on infrastructural impacts of climate changes and related investment needs on the local level; data on noise pollution.

- Local and regional evidence-based decision-making is hindered by the insufficient spatial resolution of climate models.
- Information on impacts and adaptation needs is too often scattered, making it difficult to elaborate a comprehensive approach. There is also poor coordination with the private sector in that regard.
- There is not enough information flowing to citizens and to the private sector, especially to local micro, small and medium-sized enterprises, which hinders planning, investment, and behavioural adjustment.
- There are numerous initiatives at the local level which aim at building a stronger and long-term knowledge base for adaptation planning, including assessments of risks and opportunities, new data portals, and cooperation with national data providers.

b) Challenges in assessing local/regional GHG emissions

- National data providers across the circumpolar Arctic gradually offer municipalities and regions better tools for carrying out emissions accounting.
- Not surprisingly, Scope 3 emissions are the most challenging to assess, predict and monitor at the local level.
- There are specific technical limitations reported by interviewed local decision-makers and civil servants, including: evaluating emissions originating from construction sites, off-road equipment, fishing vessels, and sea transport. Political or legal barriers may prevent the collection of data on fossil fuels.

c) Information needs: local mitigation actions and low-carbon economy opportunities

- Across the Arctic, local and regional governments are expected to or required by national/federal policies to plan for a green transition. They are also subject to national targets and requirements. However, specific Arctic features are rarely considered in national or federal climate, energy and transport policy-making.
- Information needs include: local wind pattern changes with respect to planning wind power developments; better understanding of wind energy infrastructures on biodiversity, other land uses and marine industries (of offshore installations); better assessment of needs and options related to reducing emissions from buildings in Arctic conditions; capturing emissions originating from new transport infrastructures; more specific information on the climate impacts of tourism.
- The capacity to plan for local emission reductions in the long-term is often limited by problems with acquiring information from the private sector, especially about future investment plans and related GHG emissions/reductions.
- Local and regional governments would like to obtain better information about the current state of technological development and opportunities (including locally-specific economic feasibility of introducing low-carbon technologies) with respect to the green transition within industries that are key to local and regional development: greening of air transport, electrification of fishing fleets, public transport electrifications, marine shipping decarbonisation, cold climate and green tech, or waste management technologies.

- Pursuing local/regional policies aimed at limiting overconsumption in small, remote communities is a major challenge, also due to a lack of appropriate social indicators. It is unclear what data/information could support related actions.
- There are limited technical capacities within administrations to plan green transition actions. The role of national agencies, regional/local academic and research institutions, as well as local consulting companies is therefore critical.
- The development of data tools, indicators and local modelling may be supported by participation in networks (such as the Covenant of Mayors).

d) Indigenous Peoples with respect to the green transition

- In the North American context, the issue of transitioning away from diesel power generation is among the key questions for the local green transition.
- There are several good examples of Indigenous communities taking the initiative, control and ownership of renewable energy projects.
- Achieving a green transition – locally, nationally and globally – in a way that does not interfere with their culture and traditions becomes one of the key challenges for Indigenous communities and their livelihoods. This is especially the case for the Sámi in Norway, Sweden and Finland, whose communities are rarely involved in energy investments as co-owners, proponents or partners.
- Many Indigenous governments in North America are currently developing their own climate strategies based on their priorities related to culture and traditional livelihoods. These processes are conducted in parallel to territorial/state policy-making.

Ideas towards recommendations

- There is a need to develop better tools for assessing local and global impacts of green energy investments (e.g., evaluating global vs. local impacts and benefits).
- Comprehensive databases capturing green transition planning information and data are needed, reflecting the need for more holistic policy-making.
- National and EU policymakers could consider supporting cooperation between Arctic municipalities and regions with respect to climate mitigation and adaptation. Such collaborations should focus on concrete actions and the exchange of specific models, tools, and processes, rather than on abstract sharing of good practices. A case study approach may be beneficial in this context.
- There is a need to invest more in generating data and aggregating information related to social indicators linked directly to green transition projects.

Data-driven Subnational Decision-making in the Arctic: the power of indigenous voices and data supporting the green transition

Policy Paper

Pavel Tkach and Adam Stepien, Arctic Centre of the University of Lapland

This policy paper is produced as a part of Task 7.4: Consultations with decision-makers at the sub-national level and its leading institution. The task is implemented by the University of Lapland, and is carried out within Arctic PASSION's Work Package 7, focused on supporting coherent policy- and decision-making.

The Arctic PASSION (Pan-Arctic Observing System of Systems Implementing Observations for Societal Needs) project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101003472 and is a part of the EU Polar Cluster network of EU-funded projects.

The key motivation behind Arctic PASSION is the co-creation and implementation of a coherent, integrated Arctic observing system: the 'Pan-Arctic Observing System of Systems - pan-AOSS'. It aims to overcome known flaws in the present observing system by refining its operability, improving, and extending pan-Arctic scientific and community-based monitoring and the integration with Indigenous and Local knowledge, by streamlining the access and interoperability of Arctic Data systems and services, and by ensuring the economic viability and sustainability of the observing system for years to come. The pan-AOSS shall allow for monitoring ongoing environmental changes, reduce uncertainty in predicting future system changes, support risk assessment, inform and guide mitigation and adaptation measures, and support sustainable development in the Arctic and elsewhere.

1. Introduction and methods

This policy paper deals with two themes:

- The role of Indigenous voices and Indigenous knowledge in sub-national decision-making (including the patterns of interactions between Indigenous Peoples and local/regional policymakers);
- The data availability, needs and gaps with respect to managing and planning green transition at a subnational governance level.

The above topics constitute two of a selection of themes identified as being of interest to local and regional governments and Arctic PASSION researchers alike, based on the scoping interviews and workshop conducted during the first year of the Arctic PASSION. A series of policy papers/briefs, which will be produced throughout the project timeline will cover different themes identified during the scoping phase.

The paper focuses on local and regional decision-makers and agencies in the Arctic, their practices, needs, and challenges. When discussing the subnational level of governance across Arctic states, we naturally consider various authorities that have different powers, responsibilities, structures and decision-making processes. These range from self-governing territories, regions and entities within federal states to municipalities and play different roles in planning, and impact assessment, depending on the given Arctic state. In most cases, the insights generated through the researchers' interactions with decision-makers are not directly applicable to other subnational authorities. Nonetheless, there are a number of similarities in the positioning of Arctic local, regional and territorial entities that make mutual learning possible. This includes their dependence on national data sources and guidance provided by national legislation and policies, as well as the direct responsibility these authorities and agencies have for concrete planning, assessment and decision processes in the Arctic. Moreover, as a "level of governance" characterised by diversity - from the perspective of Arctic researchers and data managers - subnational authorities and agencies also constitute a relevant group of users of Arctic information and data (produced by different systems of knowledge) and important yet often neglected participants in the existing Arctic observation systems.

The insights presented in this paper emerge from over 30 semi-structured in-depth interviews with a sample of Arctic and sub-Arctic subnational decision-makers and relevant stakeholders and rightsholders. A systematic approach of identifying and reaching out to possible interviewees was adopted to collect information and insights within themes of Policy Papers. In order to explore interactions of local and regional governance with scientific tools/data/information for further policy-making, firstly, the University of Lapland team reached out to mayors of Arctic municipalities. Further, we contacted science advisors working for Arctic regional governments and environmental/climate advisors/managers working for local administrations in Arctic cities and towns. In order to complement and provide context for interviews with policymakers, the team organised a round of interviews with scientists and researchers from national scientific agencies, such as Environment and Climate Change Canada and the Environment Agency of Iceland, in order to bring in the perspective of national data providers and gain insights on their interactions with local and regional administrations in matters related to evidence-based policy-making. In the case of researching practices related to including Indigenous knowledge and perspectives in policy-making processes, the team first contacted mayors of municipalities with a high proportion of Indigenous residents, such as Tana in Northern Norway. Moreover, the team contacted members of international Indigenous organisations, such as the Sámi Council, the Inuit Circumpolar Council, and their regional branches, such as ICC Canada. The search for contacts was conducted through analyses of municipal/regional official web pages, LinkedIn pages, and official plans, protocols, and other procedural publicly available documents, which frequently contain information about authors and their contacts. Altogether, over 260 stakeholders/rightsholders were contacted, covering all Arctic regions (excluding Russia) from December 2021 to April 2023. The interviews were conducted in accordance with pre-planned targeted lists of questions: for mayors and officials,

for science advisors/environmental managers, and for Indigenous interviewees. Interview insights were triangulated with sources such as national and regional publications and assessments relevant for the topics discussed.

This paper does not constitute a comprehensive review of either of the two themes: the inclusion of Indigenous Knowledge in decision-making or the subnational authorities' data needs related to green transition. Rather, it captures insights and challenges from different parts of the circumpolar Arctic and serves as an inspiration for promoting good practices and identifying common challenges. The paper can also support the development of research and data integration efforts – both within the Arctic PASSION project and across Arctic science – towards supporting science and research frameworks that are more conducive to enhancing evidence-based decision-making in Arctic municipalities, regions and territories.

To assess the incorporation of Indigenous perspectives in subnational administration, interviewers asked a series of questions about existing cooperative methods, as well as their successes and obstacles. The paper concludes with several ideas emerging from the interactions with regional, local and Indigenous decision-makers that could serve as bases for developing recommendations at a later stage of the project.

This paper is directed towards:

- Local and regional decision-makers and civil servants;
- Indigenous and local community leaders and activists;
- Arctic PASSION researchers and Arctic science communities at large.

2. Indigenous voices and Indigenous Knowledge in Subnational Decision-making in the Arctic

"Indigenous knowledge is very context-specific and needs to be interpreted by knowledge-holders, so, for instance, if you are taking information to regulatory hearings on development issues, you want indigenous people/knowledge-holders to come and present the information in a comfortable way and form for them, and to show how the information can be used"

Representative of the Government of the Northwest Territories, Canada

"[...] it is just a constant aspect, a major political issue to ensure that we constantly have hunters, elders, communities providing traditional knowledge (voices heard) especially in considering environmental assessment projects"

Representative of the Nunavut Research Institute, Canada

"We often encourage whatever agency or municipality or region, or Ministry to start (embark) legislation, measures, and projects – knowledge gathering is an important part of procedures that are supposed to be followed in dialogues, in consultations with indigenous stakeholders"

Representative of the Ministry of Local Government and Regional Development, Norway

The Arctic PASSION project emphasizes the importance of involving Indigenous Peoples in the Arctic in the process of enhancing and establishing new monitoring systems. Among the Arctic PASSION's top priorities is to improve international scientific observations, community-based monitoring, and Indigenous and local knowledge within observing systems covering the Arctic. The project teams recognize the value of simultaneously developing and bringing together different observation frameworks, such as Community-Based Monitoring (CBM), in-situ and satellite monitoring, Indigenous Knowledge (IK), and Local Knowledge (LK). Furthermore, Indigenous communities/organizations' insights about different ways of collaborating with different stakeholders are critical.

It is important to understand better and raise awareness among different stakeholders and rightsholders about existing cooperation patterns and interactions between local/Indigenous communities/organizations and local/regional policy-making and planning, especially with respect to environmental and climate management. Moreover, there is a need to inform different actors and decision-makers about the already available and accessible materials developed by Indigenous communities, with Indigenous communities or for Indigenous communities (e.g. in Arctic Council assessments or in research projects applying best practices). Such resources provide insights and perspectives based on Indigenous Knowledge.

This section provides selected insights on cooperation patterns between Indigenous rightsholders/stakeholders, subnational authorities and non-indigenous stakeholders. The focus is on structural and regulatory aspects and practices that facilitate incorporating data and information based on Indigenous, traditional, and local knowledge into decision-making and planning at various levels of governance. How, to whom and what to disseminate in order to deliver evidence-based and just decision-making. A comparison of patterns and collaboration experiences in the regions of the European Arctic and the North

American Arctic provides particular insights into different approaches, frameworks and practices.

The general framework of cooperation with Indigenous communities in countries and jurisdictions with a non-indigenous majority (all territories except Greenland and Nunavut) is similar – national, regional, and local governments have an obligation to consult with Indigenous communities or their representative organizations when developing a project, measure, or legal act that has potential implications for Indigenous communities. Sweden was the latest Arctic country with an Indigenous population to adopt a specific legal act dealing with consultations with its Indigenous People (Sámi), introducing the procedure in *Law (2022:66) on Consultation in Matters Concerning the Sámi People*, which went into effect on 1 July 2022.¹

Nonetheless, there are clear differences between Arctic jurisdictions with respect to the degree to which Indigenous perspectives are included beyond consultation processes and the level of meaningfulness of consultation engagements. In Yukon, Northwest Territories, and Nunavut, every project, activity, and law has potential implications for Indigenous livelihoods, interests, lands and resources, necessitating the need to carry out consultation processes. Compared to many other parts of the world, Indigenous organizations, corporations and governments in the North American Arctic gained ownership over certain traditional lands and waters, while they have strong co-decision powers elsewhere in their homelands – even if shortcomings and challenges are abundant. There is also a clear discourse and culture of Indigenous involvement among many territorial and local decision-makers, experts and civil servants. Therefore, experts in the Canadian Arctic regions stressed in the conducted interviews the importance of ensuring constant communication with Indigenous Peoples. Meaningful engagement is a central aspect in pursuing the genuine implementation of the principle of free, prior and informed consent (FPIC) from Indigenous communities in all matters affecting their cultures and livelihoods. FPIC is most prominently expressed in the 2007 UN Declaration on the Rights of Indigenous Peoples, which was supported in the General Assembly in 2007 or otherwise later endorsed by all Arctic states except Russia.

In Yukon, taking Indigenous knowledge into account has become a standard practice in climate impact assessments. A prime example is the report *Assessing Climate Change: Risk and Resilience in the Yukon*, produced by the territorial government in 2022. The report is structured around three perspectives: Indigenous, local, and scientific. The inclusion of Indigenous perspectives highlighted the importance of concepts prominent within Indigenous worldviews, such as connection, reciprocity, unpredictability, relationships, storytelling, and stewardship, and aided in understanding how Indigenous communities are connected to lands and waters. Understanding these concepts may help

¹ see *Law (2022:66) on Consultation in Matters Concerning the Sami People* (se. *Lag (2022:66) om konsultation i frågor som rör det samiska folket*) https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/lag-202266-om-konsultation-i-fragor-som-ror_sfs-2022-66

authorities to guide actions to strengthen resilience.² A similar tri-perspective approach was used in the development of the 2020 policy document *Our Clean Future: Yukon strategy for climate change, energy and a green economy*.

The 2013 Northwest Territories Lands and Resources Devolution Agreement concluded by Indigenous governments in the Northwest Territories (NWT), the Canadian Federal Government, and the Government of the Northwest Territories (GNWT) defined current patterns of cooperation between Indigenous Peoples and policymakers. On 1 April 2014, the GNWT took over responsibility for public land, water, and resource management in the territory from the Federal Department of Aboriginal Affairs and Northern Development Canada (AANDC).³ The formation of an Intergovernmental Council to allow the GNWT and Indigenous governments to interact and coordinate on lands and resource management issues was a fundamental aspect of the Devolution Agreement. Furthermore, the Intergovernmental Council is co-drafting environmental policies and laws. However, only Indigenous communities that signed the Devolution Agreement have access to the Intergovernmental Council. The Council of Leaders was formed to represent communities that are not parties to the Agreement. The latter Council lacks the breadth of competencies of the Intergovernmental Council, but it is capable of engaging in consultations and providing opinions and recommendations for future decisions. The same as in Yukon, a three-perspective approach is applied in the NWT assessment and strategic work. For example, such an approach was used in the preparation of the 2030 NWT Climate Change Strategic Framework, adopted in 2018 and its corresponding Action Plan.⁴

The situation in Nunavut is unique. The Inuit make up the majority of the population in this territory (85%). Policy-making procedures are taking place with prevalent Inuit participation and ongoing inclusion of the Indigenous perspectives. In Nunavut, the development of environmental and climate assessments and metrics relies heavily on community-based monitoring. Community-based monitoring is widely used in wildlife management, whale monitoring and tracking migration patterns, observing changes in herd populations, and analyzing water quality. Community-based monitoring works in tandem with other monitoring and survey approaches, such as spatial and aerial surveys (especially applicable in evaluating narwhal hunting). Notably, when producing policies, assessments and reports, regional and local governments consider primarily two perspectives: indigenous and local, and employ scientific outputs as a proof-checking component. The Nunavut Coastal Resource Inventory is an example of combining

² see *Assessing Climate Change: Risk and Resilience in the Yukon* <https://yukon.ca/sites/yukon.ca/files/env/env-assessing-climate-change-risk-resilience-yukon-main-report.pdf#page=24&zoom=100,0,0> p. 16

³ see *Devolution Agreement* <https://www.eia.gov.nt.ca/sites/eia/files/final-devolution-agreement.pdf>

⁴ see *2030 NWT Climate Change Strategic Framework* https://www.ecc.gov.nt.ca/sites/ecc/files/resources/128-climate_change_strategic_framework_web.pdf

Inuit Qaujimagatunqangit (*i.e. Inuit knowledge*) with the results of community-based monitoring.⁵

In Alaska, Indigenous organizations such as Alaskan Tribal Health Consortium contributed to the development of the Anchorage Climate Action Plan.⁶ However, in general, Indigenous participation in policy-making is less developed compared to the Canadian Arctic. The primary aspect of cooperation in Alaska is associated with fulfilling obligations, including to consult, under the 1971 Alaska Native Claims Settlement Act and Executive Order 13175 of 6 November 2000.⁷ Powerful Native corporations in Alaska - that hold ownership over vast areas and significant resources - are comparatively less involved in state/local strategic policy-making that does not directly affect their economic interests. In 2022, the US Fish and Wildlife Service developed a Draft Alaska Native Relations Policy where, among others, it was recognized that Alaska Native peoples have extensive knowledge of ecosystem processes - derived from long-term, local ways of knowing - that can help to guide conservation planning and strategies. The US Fish and Wildlife Service, in a Draft Policy, indicated their intent to share information and data with Tribes, Alaska Native Organisations (ANOs), and Alaska Native Corporations (ANCs), including respecting and valuing Indigenous traditional ecological knowledge received from Tribes through elders, hunters, and fisherman; research, and scientific data collection and communicating results to Tribes, ANOs, and ANCs through public outreach.⁸ Such steps demonstrate the readiness of national science and research services to more actively include Indigenous perspectives and employ a three-perspective approach in planning and reporting processes.

The high level of independence of Indigenous Peoples is a hallmark of relations between Indigenous communities and regional/territorial/state/local authorities in both the Canadian Arctic and Alaska. Many Indigenous communities in the North American Arctic are signatories to final land claims agreements with regional governments or are First Nations with treaty rights. This status offers Indigenous governments a broad range of competencies for formulating their own plans, initiatives, and suggestions that are applicable to their respective territories. Experts in Yukon emphasized that while government departments and agencies have scientific data appropriate for further use in policy-making and planning, Indigenous communities and organizations representing them do not request data from governments. Moreover, regardless of the limited use of scientific data, Indigenous communities in the North American Arctic should be viewed as potentially relevant end-users of data and information produced by scientific projects like Arctic PASSION.

⁵ see *Nunavut Coastal Resource Inventory*

<https://www.gov.nu.ca/environment/information/nunavut-coastal-resource-inventory>

⁶ see *Anchorage Climate Action Plan*

https://www.muni.org/Departments/Mayor/AWARE/ResilientAnchorage/Documents/2019%20Anchorage%20Climate%20Action%20Plan_ADOPTED.pdf

⁷ see *Executive Order 13175 of November 6, 2000*

<https://www.federalregister.gov/documents/2000/11/09/00-29003/consultation-and-coordination-with-indian-tribal-governments>

⁸ see *Draft Alaska Native Relations Policy* <https://www.fws.gov/node/267705>

In the European Arctic, collaboration between various levels of government and Indigenous communities is defined by the need to consult with the Sámi on topics that have potential implications for Indigenous cultures, livelihoods, lands and interests. The consultation procedures and their description are included in the Sámi Act of Norway, in the Swedish Law on Consultation in Matters Concerning the Sámi People, and in the Finnish Sámi Parliament Law. These legislative frameworks provide for the necessity of consulting with the Sámi parliaments prior to adopting measures, laws and, in some cases, projects that impact the Sámi people. As a result, the Sámi parliaments become relevant stakeholders for future Arctic data management and flows and can become important users of Arctic information as they formulate their positions in consultation processes. Nonetheless, due to the relatively small proportion of the Sámi in the populations of Norway, Sweden, and Finland, the involvement of Indigenous communities at national and often regional levels of administration rarely extends beyond the obligation of consultations. The situation is often different at the local level. For example, decision-makers in Tana Municipality in Norwegian Troms and Finnmark county – a municipality with a Sámi majority – consider the perspectives of the Sámi communities in policy-making. Conversely, administrations in municipalities with a lower proportion of Indigenous Peoples often formulate plans and policies based on only scientific and local perspectives.

What challenges do municipal and regional administrations have in cooperating with Indigenous communities? In interviews, representatives of local, regional, and national authorities identified three significant challenges:

- a) **Contextuality of Indigenous Knowledge:** There are situations when Indigenous knowledge-holders provide information that is strongly anchored in the more holistic cultural and livelihood context, requires a high level of local knowledge and expertise to be properly interpreted, and as a result, cannot be easily retrieved from its specific context and fully effectively used in decision-making. In the last decades, both policymakers and Indigenous communities have made efforts to recognize the legitimacy of both perspectives and establish methodologies and best practices to bring them together. However, the challenges related to the contextual character of IK remain, as policymakers often need information that can be easily included and applied in a strategic document. Policy-making processes are often not conducive to a full and appropriate engagement with Indigenous knowledge, despite intentions and principles held by local and regional authorities. In many cases, that can be explained by governmental bodies' insufficient human and financial capacities, hindering the potential for gaining expertise and fully bringing Indigenous knowledge and perspectives into decision-making.
- b) **Tension between Indigenous and scientific perspectives:** The tension may be particularly strongly experienced by policymakers in municipalities with Indigenous majorities. A relevant example is the management of the

Tana River and its resources in Norway's northernmost county.⁹ Tana Municipality administration and national water management authorities encountered discrepancies between scientific and Indigenous views on how Tana salmon should be managed, based on a different perception of environmental parameters and potential outcomes from different management scenarios. For authorities in Indigenous-majority municipalities, it is particularly difficult to balance inputs coming from Indigenous or local knowledge-holders and scientists, especially with regard to resource management, and to proceed with a management plan satisfying both sides.

- c) **Trust-building:** The historical context of relations between subnational authorities and Indigenous communities adversely affects the level of mutual trust in many Arctic regions. Sometimes, Indigenous knowledge-holders, rightsholders and stakeholders are hesitant to share their knowledge and perspectives with politicians or officials. This, in turn, impacts the decision-making processes and the acceptance of critical policies and initiatives.

In the interactions with local and regional decision-makers and officials, several ideas or good practices emerged in responding to the above challenges and barriers to Indigenous interactions with subnational policymakers.

First, there remains a need to further facilitate awareness among subnational policymakers of the specific issues and challenges that Indigenous populations face in specific regions. Policymakers and planners should visit settlements/communities to gather information and engage directly with knowledge-holders, rightsholders and stakeholders.

Second, regional political systems, particularly in the European Arctic, may benefit from increasing the number of persons with Indigenous identity in administrative bodies. For instance, an ICC Canada representative emphasized that fruitful cooperation with Inuit people had been enhanced partly because ICC Canada board members are also members of regional and local governments and organizations, allowing Inuit voices and sensitivities to be properly represented at the local level across the Canadian Arctic.

Third, scientists and researchers should more effectively listen to Indigenous Peoples and attempt to better understand their relationship to land and water. Such a better understanding has to then affect the decision-making practices and sensitivities in order to arrive at a tangible change. Moreover, the visibility of

⁹ Tana is a cross-border river between Norway and Finland with Sámi knowledge-holders living on both shores. Here, as a matter of example, we refer only to the Norwegian (Tana municipality) experiences. Norway and Finland formally established the Tana/Teno Monitoring and Research Group (MRG) in 2010, based on the Memorandum of Understanding (MoU) adopted by these countries at the ministerial level. A revised MoU was signed in December 2017 based on the Agreement between Norway and Finland on the Fisheries in the Tana/Teno Watercourse. Among the mandates of the MRG is integrating local and traditional knowledge of the stocks in their evaluations. Nevertheless, in both countries, traditional knowledge has been used mainly as a source of data rather than a knowledge system (see "Status of the Tana/Teno River salmon populations in 2022. Report from the Tana/Teno Monitoring and Research Group: [Status of the Tana/Teno River salmon populations in 2022 \(luke.fi\)](https://www.luke.fi/en/status-of-the-tana-teno-river-salmon-populations-in-2022)").

Indigenous interests and values in decision-making and planning is expanding, and authorities need to respond to these changing dynamics, among others, by cooperating with researchers who have expertise in engaging traditional knowledge holders and considering Indigenous values and interests.

Fourth, if scientific and Indigenous perspectives diverge, the results of scientific research should be transparent and represent a broad perspective on the activities that should be performed and how they would benefit both parties.

Fifth, as Indigenous perspectives are becoming increasingly important within science and policy-making in the Arctic, it is critical to ensure that the inclusion of three parallel perspectives - Indigenous, local, and scientific - becomes a normal approach to developing risk assessments, reports, plans, and policies.

There are several outputs from interactions with subnational decision-makers relevant to the Arctic PASSION project.

First, the Sámi parliaments, First Nations organizations in Yukon and the Northwest Territories, Inuit regional organizations throughout the Canadian Arctic and Native communities in Alaska should be seen as relevant end-users of information originating from Arctic observation systems supported by the Arctic PASSION project. Indigenous Peoples are often primarily seen as knowledge-holders, but the involvement of Indigenous institutions and organizations in co-management, consultation and negotiation is likely to result in the increasing need for them to utilize Arctic observation and databases. The format of the information, availability, accessibility, resolution, language and clear linkage to the specific needs of these institutions should be adjusted accordingly.

Second, research activities that affect Indigenous communities should be conducted as much as possible from three perspectives: Indigenous, local, and scientific, in order to reflect the similar trilateral approach to assessment and planning work. This implies that the co-production of these research activities should be employed to the greatest extent possible.

Third, small, remote municipalities with a majority Indigenous population are interested in scientific information services, which are capable of making Indigenous voices heard. This includes, in principle, any results of community-based monitoring (CBM) carried out within and by Indigenous communities. Arctic data services should be more pro-actively presented to municipal-level decision-makers with a focus on opportunities for concrete use.

3. Data and Knowledge for governance and planning of green transition in Arctic subnational decision-making

"We invest too little in investigating our future"

Representative of the Municipality of Vardø, Troms and Finnmark County, Norway

"We have enough data for that [green transition planning], but not enough resources to work with that data"

Representative of the Government of Nunavut, Canada

"[...] this is the main gap: transitioning from information from climate models to understanding how it [climate change] will affect people and infrastructure or translation of concrete scientific data to understandable conclusions about impacts"

Researcher from the University of Alaska, Fairbanks

The importance of enhanced data and information necessary for planning climate change adaptation and green transition at regional and local levels was identified by participants of the scoping process during the first year of Arctic PASSION as one of the relevant themes related for further investigation, where subnational decision-making is linked to Arctic data systems. In this section, we consider the key information needs, knowledge gaps and opportunities to support Arctic policymakers as they strive to put their communities, municipalities, regions and territories on the path to climate adaptation and resilience, stronger mitigation efforts, and a low-carbon economy.

Local and regional governments play an important role in pursuing the green transition, both in climate mitigation and adaptation, as well as in making progress towards a circular economy. Many subnational governments across the circumpolar North have developed and adopted energy and climate plans and climate mitigation and adaptation strategies; Finnish Lapland, for example, established a regional Green Deal Roadmap in 2021.¹⁰ Among the key instruments are spatial planning, local energy and heating systems, planning transport corridors, and supporting the development of electric vehicles infrastructure.

The green transition governance and planning at the regional and local level is highly challenging, as its effectiveness depends on the availability and reliability of a broad spectrum of information and knowledge, including:

- understanding emissions occurring within a given area;
- ability to evaluate the likely effects (on local emissions) of changes in economic activities, modalities of energy production and consumption, transportation

¹⁰ Vidje, L. (2021). Summary of external analysis in Northern Sweden, Finland, and Norway – GRUDE. Project. URL: <https://www.grudeproject.eu/wp-content/uploads/2021/12/SummaryAnalysis2021Grude.pdf>; Henna Kukkonen, Henna, Reeta Sipola and Tuuli Nivala (Eds.). Green Rural Economy - Promoting Green Transition in the Rural Arctic. Series B. Research reports and Compilations 12/2022, Lapland University of Applied Sciences, Rovaniemi 2022; Lapland's Green Deal, presentation by Kristiina Jokelainen, SmartNorth, URL: <https://www.interregeurope.eu/sites/default/files/2022-09/Presentation%20by%20Kristiina%20Jokelainen%20on%20Fostering%20the%20Adoption%20of%20the%20Green%20Transition%20and%20Digitalization.pdf>

systems and networks, as well as different policy options available to local and regional governments;

- evaluating current impacts of climate change, acquiring foresight into future impacts and corresponding adaptation needs at the local or regional level;
- understanding impacts of key green transition developments (renewable energy expansion, critical minerals extraction, the electrification of transport, extractive and processing industries);
- clear understanding of the implications of national climate adaptation and mitigation policies on local and regional measures, funding, and socio-economic trajectories;
- insights into future national and international policy developments.

With regard to all the above aspects, Arctic subnational governments, including Indigenous governments, require access to and availability of a broad spectrum of data and information, in formats corresponding to administrative capacities and allowing interactions with citizens, stakeholders and rightsholders. Moreover, a key challenge is bringing all these aspects together.

Understanding adaptation needs

While largely outside of the scope of this policy paper, climate change impacts and related adaptation are intrinsic elements of green transition planning. This is particularly true for Arctic and sub-Arctic regions that warm at the rate two-to-seven times the global average,¹¹ as their economic and policy choices, economic development and the availability of financial resources, livelihoods, food security and public health are strongly linked to local/regional climate impacts.

Limited administrative capacities - human, financial and procedural resources - across the circumpolar Arctic hinder the possibilities for conducting evaluations and assessments. Some areas, like Canada's East Arctic, have poor coverage of historical scientific/monitoring data and few data points for many environmental indicators and for establishing appropriate baseline information (Nunavut, Canada). However, information based on Indigenous Knowledge and generated by research projects incorporating is available and may be utilized for adaptation planning purposes.

In the US, similarly, while there is very good national climate data coverage, the information for Alaska was judged to be insufficient (Anchorage, Alaska).

Consequently, local and regional participants in our review highlighted a number of gaps and challenges with respect to understanding impacts and adaptation needs:

- a lack of baseline data in some communities/areas with respect to environmental and risk monitoring (e.g., Nunavut, Canada);
- a better understanding of the ocean and interactions between the ocean and local environments, to increase predictability related to marine

¹¹ E.g., Rantanen, M., Karpechko, A.Y., Lipponen, A. et al. The Arctic has warmed nearly four times faster than the globe since 1979. *Commun Earth Environ* 3, 168 (2022).

- resources (Newfoundland and Labrador, Nunavut, Canada; Greenland; Vardø, Norway), and in particular changes occurring in coastal waters, affecting e.g., local fisheries (e.g., Kvænangen, Vardø Norway);
- an assessment of changes in precipitation, hydrology, lake ice and flooding risk (Harstad, Norway; Nunavut, NWT, Canada; Juneau, Alaska; Kuusamo, Finland);
 - lack of good predictions for changes in wind patterns in the North Atlantic (Newfoundland and Labrador, Nunavut, Canada; Harstad, Norway) affecting small-scale and large-scale fisheries, forestry, shipping, and potentially tourism – all of which constitute key industries for local/regional economies;
 - still not sufficiently comprehensive understanding of impacts on traditional livelihoods, including those central to Indigenous Peoples' cultures and identities, such as impacts on harvesting, reindeer herding and coastal fishing (e.g., Nunavut, Canada; Tana, Norway);
 - lack of appropriate understanding at the local level of the impacts on infrastructure (permafrost, coastal erosion, landslides, extreme weather events), in particular in the long-term with respect to planning and investment decisions (Nunavut, Yukon, NWT, Yellowknife, Canada; Fairbanks, Alaska; Kvænangen, Norway; Avannaata, Greenland), e.g., lack of good high-resolution mapping of permafrost, avalanches and landslides, as well as poor quality of assessment of related infrastructure resilience;
 - data on changes in forests, lakes and wildlife at a local level, including changes related to wildfires and new diseases, e.g., algal blooms in northern lakes and changes in lake nutrients, impacts on insects and pollinators (Yukon, Canada; Kvænangen, Tana, Norway; Nunavut, Canada; Anchorage, Fairbanks, Alaska; Kuusamo, Finland);¹²
 - lacking information about changes/impacts on food and nutrition, especially with regard to country/subsistence foods (e.g., Anchorage, Alaska¹³);
 - insufficient data and knowledge on invasive species and their effects on local ecosystems and local economic activities, especially fisheries, as well as the impacts these changes have on culture and livelihoods (e.g., Nunavut, Canada; Kvænangen, Vardø Norway);
 - lack of good understanding of the cumulative impacts of climate change, pollutants and other factors on local human health (and from the 'One Health' perspective) (Newfoundland and Labrador, Nunavut, Canada; Anchorage, Alaska) and the indirect effects of health risks on culture;
 - data on noise pollution and better assessment of noise impacts originating from different economic activities (Kuusamo, Finland);
 - the assessment of cumulative impacts of economic developments, including shipping and resource extraction, combined with climate change impacts in specific local contexts (e.g., Nunavut, Greenland).

¹² Wildlife management and changes is an area where community-based observation is particularly relevant. An example of good practice comes, e.g., from Kemi in Finland, where a local private initiative (Xenus) carries out long-term observations of bird populations.

¹³ See, e.g., the work of the Alaska Native Tribal Health Consortium.

Local and regional authorities face challenges in coping with the insufficient spatial resolution of climate models and the very high uncertainty of local predictions, both of which they use for evidence-based decision-making (Harstad, Tana, Norway; Luleå, Sweden).

Some interviewees (e.g., Anchorage, Alaska; Newfoundland and Labrador, Canada; Tana, Norway) highlighted that while there is good general knowledge about changes, there is far too often not enough specific information on local climate impacts and risks to enable evidence-based policy-making. There is also not enough of that information flowing to citizens and to the private sector, especially to local micro, small and medium-sized enterprises, which hinders planning, investment, behavioural adjustment, as well as an informed involvement in public policy developments. The specificity and translation of data is not sufficient for climate adaptation and green transition planning.¹⁴

Representatives of local and regional governments (e.g., Nunavut, Canada) highlight that information on impacts and adaptation needs is too often scattered, making it difficult to elaborate a comprehensive approach. This is exacerbated by the regulatory and policy limitations of bringing different aspects of adaptation planning together (due to the fragmentation of responsibilities and decision-making processes). There is also poor coordination with the private sector (which often plays a major role in local adaptation capacities, opportunities and actions) in that regard. Furthermore, cuts in public funding for monitoring sometimes result in incomplete data series, making the identification of long-term trends more difficult (e.g., about lake ice in Kuusamo, Finland).

Nonetheless, there are numerous initiatives at the local level which aim at building a stronger and long-term knowledge base for adaptation planning. Subnational authorities carry out assessments of risks and opportunities, create new comprehensive data portals, enhance cooperation with national data providers and use – gradually improving – national services more effectively (e.g., Yukon, Nunavut, Canada). Databases for climate change resilience of local and regional infrastructure are being developed (e.g., Yukon, Canada). Some national governments offer courses for municipal and regional officials on tools for and approaches to climate adaptation, as well as on how to evaluate their own carbon footprint (e.g., in Sweden) properly. There is also some collaboration among municipalities and regions with respect to climate data collection and assessment (e.g., within Alaska: Fairbanks, Anchorage and Juneau; in Canada: Yellowknife, Whitehorse and Iqaluit; in Norway, utilizing experiences of Oslo climate budgeting).

Challenges of assessing local/regional GHG¹⁵ emissions

¹⁴ One example of good practice in this area is Scenario Network for Alaska + Arctic Planning (SNAP, see uaf-snap.org), developed at the University of Alaska Fairbanks, which turned climate data into tools on specific topics, e.g., allowing checking elements such as changes in vegetation or harvesting seasons in Alaska.

¹⁵ Greenhouse Gases

Assessing current emissions and changes in these emissions is a basis for green transition and decarbonization planning. However, both in general terms and in the specific Arctic local/regional context, emissions accounting is far from straightforward. There are specific technical limitations reported by local authorities, including evaluating emissions originating from construction sites, off-road equipment, fishing vessels, and sea transport (e.g., Reykjavik, Iceland; Harstad, Vardø, Norway; Anchorage, Alaska). Political or legal barriers may prevent the collection of data on fossil fuels sold to consumers, making it difficult to assess progress (Juneau, Alaska).

Many interviewees highlighted that Scope 3 emissions¹⁶ are the most challenging to assess, predict and monitor. This is true, e.g., for imports related to electric cars and renewable energy infrastructure, as well as air and sea transport (emissions related to production and transport of such components and products, as well as tourism, cruise ships, fisheries) (e.g. Reykjavik, Iceland; Luleå, Sweden; Rovaniemi, Finland; Harstad, Norway; Juneau, Alaska). Moreover, the lack of long-term data hinders the local capacity to identify trends and plan future reductions. The data are also at times available late or not updated often enough. Assessing land use change (as a contributor to emissions and carbon removal) and ecosystem services (including climate ecosystem services, e.g., of wetlands) may be particularly challenging at the local level (e.g., Siglufjordur, Dalvik, Reykjavik and neighboring municipalities, Iceland; Lapland and Rovaniemi, Finland; Norrbotten, Sweden).

Some communities use the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC)¹⁷ (e.g., Harstad, Norway; Reykjavik, Iceland) or apply indicators and data collection guidelines developed by the Covenant of Mayors (Akureyri, Iceland).¹⁸ National data providers across the circumpolar Arctic gradually offer municipalities and regions better tools for carrying out emissions accounting (e.g., in Finland and Norway).¹⁹ Many municipalities and regions, especially those with smaller administrations, use external consultants to assess their emissions, footprint and changes related to possible future economic developments and policy choices (e.g., Akureyri, Dalvik, Iceland; Avannaata, Greenland).

Information needs for local mitigation actions and pursuing low-carbon economy opportunities

¹⁶ On the three tiers of emissions accounting, see e.g. a factsheet by the Canadian Green Municipal Fund, <https://greenmunicipalfund.ca/resources/factsheet-municipal-governance-deep-decarbonization>

¹⁷ See, https://ghgprotocol.org/sites/default/files/ghgp/standards/GHGP_GPC_0.pdf

¹⁸ Global Covenant of Mayors for Climate and Energy. European Commission Joint Research Centre, Technical Report on Climate indicators (Kona et al. 2016), see https://publications.jrc.ec.europa.eu/repository/bitstream/JRC97924/jrc97924%20%20com%20monitoring%20indicators_online.pdf

¹⁹ For instance, in the beginning of 2023, the Finnish Environment Institute (SYKE) created a database and calculator tool for Finnish municipalities. See <https://kulutus.hiilineutraalisuomi.fi/>

Green transition across the circumpolar Arctic can be seen as a major socio-economic opportunity for northern regions and communities, but it is also a source of concerns and tensions. In the context of Arctic communities, green transition refers primarily to the expansion of renewable energy production, extraction of critical minerals necessary for a global low-carbon economy (e.g., Tana, Norway; NWT, Canada; Kuusamo, Finland), as well as to the electrification of transport, extractive industries and processing activities. In addition, among elements of the Arctic green transition landscape are the pursuit of a circular economy, including better waste management (e.g., Nunavut, Canada) and energy efficiency efforts.

Across the Arctic, local and regional governments are expected to or required by national/federal policies to plan for a green transition. They are also subject to national targets and requirements. However, the features of many Arctic communities result in additional challenges for meeting such objectives. First, many Arctic communities are dependent on air and sea transport, both characterized by high emissions and remote perspectives for decarbonization (e.g., airports in Finnish Lapland and a major port in Alaskan Anchorage). Second, the dominance of extractive and heavy industries in parts of the Arctic (mining, fisheries, smelting) means that opportunities for GHG emissions reductions are relatively more restricted for these locations compared to other areas (e.g., LKAB mine in Swedish Kiruna or fisheries in Norwegian Troms and Finnmark and Nordland). Third, the cold Arctic climate, challenging weather, remoteness and long distances mean that Northerners often have higher energy use than their compatriots living in southern regions (e.g., Nunavut, Canada; Tana, Norway; Lapland, Finland). Fourth, there are still uncertainties regarding the operation of many low-carbon technologies in the Arctic climate. The small size of Arctic populations and economies (and, on a global scale, very limited possible GHG reduction gains) restricts private and public investments in technological developments that target Arctic conditions, specifically outside of extractive and energy industries. The small scale also means that architects, engineers and designers do not have sufficient information or incentives to develop construction methods or products that address challenges related to the northern climate (e.g., Kuusamo, Finland; Nunavut, Canada). Fifth, small populations and the small size of industrial clusters also affect the possibilities for pursuing a circular economy and achieving sustainable waste management objectives (e.g., Nunavut, Canada).

Specific Arctic features are rarely and only to a limited extent taken into account in general national or federal climate, energy and transport policy-making (NWT, Yellowknife, Canada; Tana, Norway; Lapland, Rovaniemi, Finland; Norrbotten, Luleå, Sweden). This raises concerns related to policy/measures fairness and increased living costs in places that often already face socio-economic challenges (Yukon and Nunavut, Canada). Furthermore, there are arguments made that certain developments that result in increased GHG emissions may be globally or nationally more advantageous to be located in the North compared to other parts of the world (e.g., data centres, mines or smelters when using renewable energy and/or operating in a colder climate). However, these developments contribute to local/regional carbon budget accounting and sophisticated measures and tools are needed to calculate such impacts. Policy- and decision-making in this context constitute a particular challenge for subnational authorities and agencies.

Electrification of transport, shipping, resource extraction and processing (in marine shipping, fisheries, mining – e.g., in LKAB Kiruna mine – and smelting) are seen as key pathways for the green transition. However, such developments – both at national/global and local levels – require significant expansion of electricity production. If these developments are to be genuinely a part of the green transition, an increase in the share of renewable energy is necessary, in addition to new energy grids and infrastructure. Advancing green solutions based on electricity use, without considering energy sources (especially in communities and regions disconnected from national grids) is not feasible or environmentally sustainable. A holistic approach to the transition to an electricity-powered economy is needed (Harstad, Norway; Nunavut, Canada).

Therefore, it is necessary to assess the future energy needs and plan an expansion of renewable energy accordingly. However, this needs to be done in light of the impacts arising from these developments on local ecosystems, biodiversity, livelihoods and other industries (e.g., Vardø, Tana, Norway; Greenland). Especially hydropower and wind power investments carry a risk of adverse impacts and tensions, and the need for these investments has to be carefully justified (Kvænangen, Tana, Norway).

Specific related information and data needs include:

- Lack or high uncertainty of predictions for local wind patterns affects the long-term planning of wind power developments, especially when the need to reconcile developments with other land uses - e.g. reindeer herding or tourism – necessitates scrupulous spatial planning (Lapland, Finland; Vardø, Norway).
- Improving understanding of the impacts of wind energy installations and related infrastructure on biodiversity, reindeer herding and other livelihoods (Kemi, Finland; Tana, Norway; Luleå, Norway).
- Insufficient understanding of the impacts of offshore wind power developments on marine industries operating close to the coast (fisheries, including small fisheries and fish farming) (Vardø, Kvænangen, Norway).
- Better assessment of the needs and options related to reducing emissions from buildings in Arctic conditions (Reykjavik, Iceland; Luleå, Sweden).
- Capturing emissions originating from new transport infrastructure is planned as an element of green transition (Anchorage, Alaska; Reykjavik, Iceland).
- Some interviewees (e.g., Harstad, Vardø, Norway) highlighted that local environmental impacts and carbon emissions of green transition technologies and investments (often occurring up in the value chain) are either poorly understood or information on these aspects is not easily available. This refers, e.g., to the impacts of electric vehicles and battery production and transport, impacts related to critical minerals extraction, or impacts of new power grids.
- As tourism is among the key growing industries across the Arctic, offering alternative sources of income to extractive industries, there is a need for more specific information on climate impacts on tourism (e.g., snow season), as well as on the GHG emissions generated by tourism (e.g., Juneau, Canada; Rovaniemi, Finland).

- There is a need to limit the unpredictability related to marine resources, which would facilitate planning towards more sustainable fisheries, fish farming and marine tourism (e.g., Greenland; Harstad, Tana, Norway).

A cross-cutting challenge highlighted by interviewees from different parts of the Arctic is the fragmentation of data and information related to the green transition (to different industries and sectors, different regulatory frameworks), while planning should be a coherent undertaking. There are calls for comprehensive and easy-to-use databases (e.g., Kuusamo, Finland; Luleå, Sweden).

In Norway, climate budgeting was identified as a key tool for planning long-term emission reductions. While challenging for northern municipalities and still under development, it is seen as having potential for allowing integration of different data and information into a consolidated knowledge package that can be useful for decision-makers and for communicating with the public (e.g., Harstad, Norway).

The capacity to plan for local emission reductions in the long-term is often limited by problems with acquiring information from the private sector, especially about future investment plans and related GHG emissions or reductions (e.g., Kemi, Finland; Harstad, Norway; Luleå, Sweden). The challenge here is corporate confidentiality and competition. This is particularly important as economies of northern sparsely populated regions – with large primary sectors – move towards a low-carbon future, a process in which large private sector actors appear to play a significant role (based on the dynamics uncovered in Swedish Norrbotten).²⁰ Lack of close interaction with the private sector can easily become a handicap for effective local/regional evidence-based governance. In major global/European economic centres and big cities, one investment rarely significantly affects the overall carbon budget; however, such highly significant influence is common for smaller communities in regions that have a large share of primary/extractive industries and primary processing activities (mining, smelters, forestry produce processing, etc.). Poor data exchange (including modelling outputs) makes it difficult for local and regional policymakers to properly plan and evaluate the actual effects of current and proposed subnational governments' actions and policies. Despite calls for and initiatives towards better collaboration between policymakers and companies, it appears that in some locations the exchange of information and the availability of private sector data has deteriorated compared to the situation 15-20 years earlier (Kemi, Finland).

Local and regional governments would like to obtain better information about the current state of technological development and opportunities (including local economic feasibility of introducing low-carbon technologies) with respect to green transition within industries that are key to local and regional development, e.g. on:

- the potential for the greening of air transport (on which many Arctic communities depend for basic accessibility);

²⁰ Garbis, Zoe, Erin McCarthy, Robert W. Orttung, Gregory Poelzer, Melissa Shaiman, Jacob Tafrate (2023). "Governing the green economy in the Arctic", *Climatic Change* 176:33.

- the electrification of fishing fleets;
- the electrification of public transport and greening transportation networks (including possibilities of increasing bicycle roads and walking paths to centres of cities/towns);
- the decarbonization of marine shipping in a cold climate (key for limiting scope 3 emissions in many Arctic remote localities and communities with large ports);
- the long-term operation of green technologies in a cold climate (especially electric cars and machinery);
- waste management technologies.

A larger issue – as highlighted by some policymakers (e.g., Harstad, Norway; Luleå, Sweden) – is how to pursue policies that limit overconsumption in Western societies, specifically from the perspective of smaller remote communities. Understanding social and socio-economic processes and developing appropriate social indicators is important in that context.

A challenge emphasized by most interviewed subnational decision-makers and civil servants is limited technical capacities within administrations to plan green transition actions (e.g., Tana, Norway; Luleå, Sweden; Nunavut, Canada). The role of national agencies and databases,²¹ regional universities and research facilities is therefore critical.²² Cooperation with local universities and institutes was often stressed by interviewees as particularly valuable as these institutions and researchers usually have a relatively good understanding of the local context and sensitivities and interact directly with decision-makers. Some participants suggested that there is a need to move from stakeholder engagement to stakeholder training in the context of climate mitigation actions and downscaling from global/national to local/regional models and information (e.g., in Newfoundland and Labrador, Canada). Many interviewees highlight the importance of using consulting companies in this context.

There are also benefits in terms of using and developing data tools, indicators and local modelling coming from participation in global networks, e.g., the EU's 100 cities project or the Covenant of Mayors (e.g., Reykjavik, Akureyri Iceland; Luleå, Sweden).

Arctic Indigenous Peoples and green transition policies and developments

Understanding green transition, specifically from the perspective of Indigenous communities, was one of the priority topics in interviews with officials representing municipalities and regions with significant Indigenous populations or Indigenous organizations. We asked: What does green transition mean for your (Indigenous)

²¹ For instance, the Government of Northwest Territories in Canada is actively engaging the Central Association of Municipalities in order to identify the capacity-raising needs of municipal decision-makers and civil servants and find areas where these actors can be supported.

²² A good example of supportive service developed and utilized by municipalities (e.g. Harstad, Norway) is Norwegian Klimakost <https://www.klimakost.no/>

community/municipality/region/organization? What is the primary advantage of being green for your community/municipality/region/organization?

Interviewees from the North American Arctic, primarily from Canada's Arctic territories, emphasized their communities' reliance on diesel generators and fossil fuel-based transport, while having a clear understanding of the challenges of the energy transition. At the same time, many highlighted the benefits of a low-carbon economy, both locally and globally. Participants from Nunavut underlined that fossil fuel prices are increasing, adversely impacting final electricity and heating prices. Interviewees from Canadian territories and Alaska, including Indigenous communities, voiced aspirations for the development of alternative energy sources, including hydropower, solar, and wind power, as well as a gradual reduction of reliance on diesel heating and electricity generation. Yukon policymakers highlighted already present good practices for the energy transition in local communities, as well as the effective operation of independent power producers, including producers owned and operated by local Indigenous residents.

The experience of the small Gwich'in hamlet of Old Crow in the Yukon is a good example of a successful energy transition owned and developed by the Indigenous population (Vuntut Gwitchin First Nation). This community is almost a hundred miles away from any other community and is not connected to a major road system - or any road system at all - nor to the Yukon centralized energy grid. Because of its remote location, it has relied on diesel for energy, which must be carried in by plane, resulting in one of Canada's highest economic and ecological electricity expenditures. The Vuntut Gwitchin First Nation established a solar PV facilities farm in Old Crow in collaboration with ATCO Electric Yukon, ensuring electricity generation for the next 25 years and securing an important source of revenue for the community - as ATCO Electric Yukon purchases energy produced on this farm.²³

"Climate change is a threat to the Vuntut Gwitchin, to the lands, water and animals we rely on for sustenance and to practice our culture. Reducing our dependency on fossil fuels through innovative clean energy projects and a green economy that provides sustainable jobs for our youth are opportunities that build community resiliency, energy security and a better future for our children." - Vuntut Gwitchin Government Chief Dana Tizya-Tramm²⁴

In Yukon, tribal councils and Indigenous governments are currently developing their own climate strategies in a process parallel to territorial policy-making. This is based on their priorities related to culture, traditional livelihoods, and enhancing climate mitigation via stewardship, as well as specific ideas on local development. Among the objectives is to create new opportunities for reconnecting with their own culture and pursuing climate-relevant innovations that emerge from Indigenous cultures. Interestingly, the First Nations and Inuit policymakers are

²³ see *Old Crow Solar Project* <https://electric.atco.com/en-ca/community/projects/old-crow-solar-project.html>

²⁴ see *Our Clean Future: Yukon strategy for climate change, energy and a green economy* <https://yukon.ca/sites/yukon.ca/files/env/env-our-clean-future.pdf> p. 5

not engaging territorial government or civil servants in this process, including not seeking support for acquiring information on local impacts and predictions.

The emphasis of Sámi interviewees was on achieving a green transition in a way that does not interfere with their culture and traditions. Officials of municipalities mostly occupied by the Sámi people, such as Tana Municipality in Norway's Arctic, have highlighted initiatives targeted at lowering transportation, energy, and building emissions. However, unlike the Canadian Arctic, the Sámi in Norway, Sweden, and Finland are very rarely involved in the energy industry. Among the main concerns is preventing industries from interfering with reindeer herding activities through impacts on grazing areas and migratory routes of reindeer, as well as avoiding adverse implications of developments on traditional fishing and hunting practices.

The importance of Indigenous culture and traditions, as well as the need to seriously take into account traditions and culture in measures aimed at ensuring a green transition, has been highlighted across the Arctic.

4. Selected ideas towards recommendations:

At the end of the Arctic PASSION timeline, the project team responsible for interactions with local and regional decision-makers will propose – based on discussions with policymakers – a set of recommendations for enhancing the use of Arctic data in subnational decision-making. Below, we suggest some preliminary ideas related to the subnational authorities' interactions with Indigenous Peoples, the use of Traditional Knowledge and pursuing of a green transition. We will build on these and other ideas as we develop concrete recommendations later on.

Indigenous Peoples' knowledge and participation:

- a) Indigenous communities – if they express interest – should be supported in developing their own climate mitigation and adaptation strategies. Local and regional authorities are often in a good position to support such efforts with relevant data and information. The key challenge – related to both Indigenous and administrative capacities – is to translate data into formats that would be useful for Indigenous communities' climate strategy-making.
- b) It is important that regional administrations become more active in identifying knowledge and data gaps that Indigenous communities face, including in matters related to the practical realization of Indigenous interests and perspectives. The key challenges are a lack of human resources and financial capacities for ensuring continuous communication between administrations and Indigenous communities and, in some cases, a lack of trust from Indigenous communities, requiring dedicating additional time and efforts towards trust-building.
- c) Private stakeholders, such as energy producers, need to familiarise themselves with the legal obligation to consult with Indigenous communities prior to project development and implementation if the project may directly or indirectly impact the traditional activities and livelihoods of the Indigenous communities.²⁵ The business must also understand that in breaching such obligation, they will face the consequences, such as the case of the Fosen Vind project in Norway in 2022 and 2023.
- d) Scientists and policymakers - when producing policies and analyses/assessments for regions inhabited by Indigenous Peoples – need to more actively employ three-perspectives evaluation approaches and communicate Indigenous perspectives to non-indigenous audiences. In order to ensure such dynamics, more services dedicated to collecting and representing Indigenous knowledge and perspectives should be developed.

Green transition:

- e) There is a need to develop better tools for assessing local and global impacts of green energy investments (especially wind power, hydropower and critical minerals extraction). It is important to find ways of evaluating global vs. local impacts and benefits, in order to allow decision-makers,

²⁵ See also, Anaya, James (2013). Extractive industries and indigenous peoples. Report of the Special Rapporteur on the rights of indigenous peoples, James Anaya. Human Rights Council, A/HRC/24/41.

stakeholders and rightsholders to have a more holistic context for discussing specific plans and projects.

- f) Some subnational decision-makers call for comprehensive databases capturing or bringing together their diverse information needs related to green transition planning. Such databases could connect current data, local and Indigenous perspectives on ecosystems and used resources, predictions, modelling tools related to different technologies, as well as long data series and mapping tools, including perhaps aerial photographs.
- g) National and EU policymakers could consider expanding their support for cooperation between Arctic municipalities and regions with respect to climate mitigation and adaptation. Such cooperation should cover both neighbouring localities as well as communities sharing similar challenges. However, the cooperation should go beyond general discussions and abstract sharing of good practices, and be instead based on concrete actions and exchange of specific models, tools, and processes.
- h) A case study approach with respect to developing and sharing local solutions has been proposed as potentially valuable for Arctic regional and local administrations, as compared to copying directly tools and methods developed by central governments or agencies.
- i) There is a need to invest more in generating data and aggregating information related to social indicators linked directly to green transition projects. The development of a set of social indicators for the Arctic green transition should be the first step in this process.
- j) Community-based monitoring (CBM) as a means of gathering localised information about climate and the environment should be used more actively in subnational policy-making. The CBM should be promoted towards decision-makers and civil servants as a valuable source of information complementing Arctic data services. In addition, the CBM can support local engagement and help to introduce a tangible local - "human face" - perspective in environmental reports and assessments. That will facilitate the abovementioned three-dimensional approach to policy-making and planning processes in the Arctic.

5. Next steps

Based on the discussions with policymakers in developing the Background Paper (Deliverable 7.2) and completed in 2022 the Scoping Workshop on Data-driven subnational decision-making in the Arctic, the topics for further conversations, desk research and covering in subsequent policy papers (Deliverables 7.4, 7.6, 7.9) have been identified:

- Defining data needs for planning green transition at the subnational level in the Arctic. *(Covered in Deliverable 7.4)*
- Identifying legal requirements and their role in shaping the ways in which scientific knowledge, local knowledge (LK) and Indigenous Knowledge (IK) are used. *(Covered in Deliverable 7.4)*
- Identifying the best practices in terms of making data accessible, understandable and useful for Arctic subnational governance and society.
- Creating an overview of the movement of data generated at the local and regional level (including local knowledge (LK) and Indigenous Knowledge (IK) and community-based observations). Where does the information end up? Is it accessible and reusable, is it uploaded or linked to national or international databases and services? Are there any good practices that can be showcased?
- Identifying the role of knowledge translation agents (organizations and individuals) in the data used by local and regional decision-makers (including national services and private consulting).
- Mapping the distribution of governance responsibilities within areas relevant to chosen Arctic PASSION pilot services.

The University of Lapland team will continue to carry out interviews with regional and local officials across the Arctic as well as with members of Indigenous communities and private stakeholders, focusing on the above topics. The research will be enriched by interactions during a major conference, which will be used to define and co-produce recommendations, such as a panel with regional and local decision-makers at the 'Arctic Spirit' (Rovaniemi, Finland) or 'Arctic Circle Assembly' (Reykjavik, Iceland), organized ideally in collaboration with the Arctic Mayors Forum. Towards the end of the Arctic PASSION project timeline, the team will develop a set of concrete recommendations for the involvement of subnational decision-makers in pan-Arctic data systems and pan-Arctic observation.

Interviews for the purpose of developing the Policy Paper "**Data-driven Subnational Decision-making in the Arctic: the power of Indigenous voices and data supporting green transition**" were conducted with experts and officials from the following bodies:

- Municipality of Rovaniemi, Finland;
- Municipality of Kemi, Finland;
- Municipality of Kuusamo, Finland;
- Luleå municipality, Sweden;
- Stockholm municipality, Sweden;
- Municipality of Harstad, Norway;
- Municipality of Tana, Norway;
- Municipality of Vardø, Norway;

- Municipality of Kvænangen, Norway;
- Department of Indigenous and National Minority Affairs at the Ministry of Local Government and Regional Development, Norway;
- Norwegian Centre for Climate Services, Norway;
- Avannaata municipality, Greenland;
- Municipality of Reykjavik (Greater Reykjavik Area), Iceland;
- Environment and Climate Change Canada;
- The Government of Yukon, Canada;
- The Government of NWT, Canada;
- The Government of Nunavut, Canada;
- Inuit Circumpolar Council Canada;
- Nunavut Research Institute, Canada;
- City & Borough of Juneau, Alaska, USA;
- Anchorage Municipality, Alaska, USA.